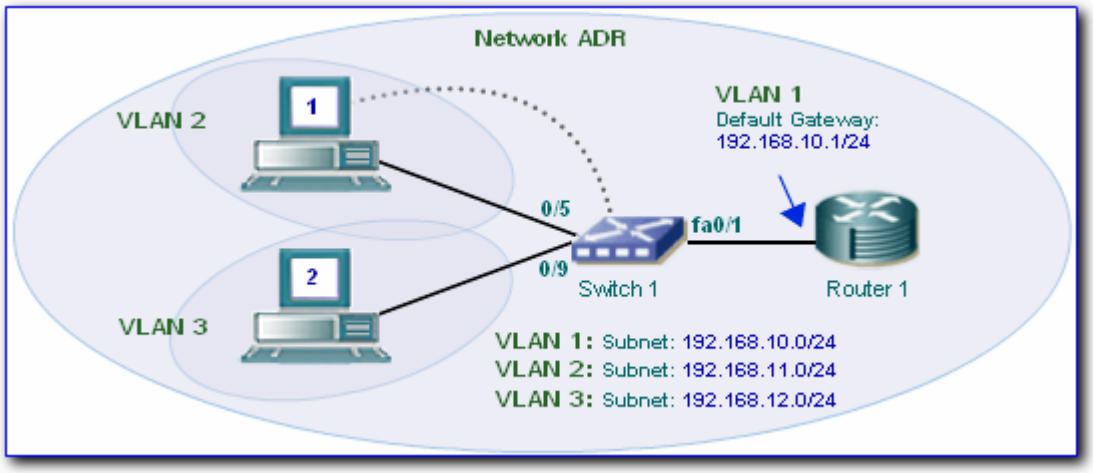
Portfolio Exercise 6c: Configure Inter-VLAN Routing

Objectives

- Create and name VLANs and assign member ports to them.
- Create an 802.1q or ISL trunk line between a switch and a router to allow different VLANs to communicate.
- Test the functionality of the VLANs and the routing.
- *Collect portfolio evidence for part of Grading Criteria M4*

Scenario



This practical provides you with the opportunity to demonstrate that you can configure inter-VLAN routing between a switch and a router and so allow communication between VLANs.

Task 1: Document the Configuration

a. Specify the configuration of the switch and the hosts

Using the diagram above for reference, fill in the table below. Details such as the switch name and passwords you may decide for yourself.

	Switch 1
Name	
Enable Secret Password	
VTY and Console Password	
VLAN 1 gateway address (use the first available address on the subnet)	
VLAN 2 gateway address (use the first available address on the subnet)	
VLAN 3 gateway address (use the first available address on the subnet)	
Switch IP address and subnet mask (use any free address on the VLAN 1subnet)	

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Using the diagram for reference and the information below, fill in the table below with the port assignments.

◊ **VLAN 1 Ports:** Assign ports 0/1 to 0/4 to the management VLAN.

◊ **VLAN 2 and 3 Ports:** 4 ports need to be assigned to each VLAN.

◊ **Trunk Line Port:** A Fast Ethernet port is required for the trunk line to the router.

- *1900 switch Ethernet ports cannot be used for trunk lines. You will need to reserve one of the Fast Ethernet ports for the trunk line. The Fast Ethernet ports are usually the highest ports, e.g. fa0/26. You will need to check this on the switch*.
- *Any 2950 switch Fast Ethernet port can be used for a trunk line. Typically fa0/1 is used.*

◊ **Encapsulation:** When data is passed on a trunk line between switches, the formatting of the packets is changed. The switches on each end of a trunk line need to be in agreement as to which format to use. The choices are **802.1q** encapsulation or **ISL** encapsulation. If there is a different trunking encapsulation on the two ends of the link the switches will not able to communicate.

- *1900 switches only support ISL encapsulation*
- *2950 switches only support 802.1q encapsulation*

	Switch 1
VLAN 1 ports	
VLAN 2 ports	
VLAN 3 ports	
Trunk line port	
Encapsulation	

Now decide on IP addresses for the hosts and fill the table below. *You should note that each host is on a different subnet and so requires a **different gateway address**. Check your first table.*

	IP Address	**Subnet Mask**	**Default Gateway**
Host 1			
Host 2			

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Task 2: Configure the Switch and the Hosts

You will need to configure **the switch** as follows:-

- Set the name and the enable, console and VTY passwords
- Set the VLAN management port with an IP address, subnet mask and default gateway.

a. Configure the switch

As a reminder, the various configuration commands are specified below. You will need remember which mode to be in for yourself, e.g. global configuration mode etc.

For each switch, carry out the following:-

Delete any existing configuration including the startup configuration and any **`vlan`** database information stored in a **`vlan.dat`** file. See below.

- For 2900 and 2950 series switches, use the **erase startup-config** and **delete flash:vlan.dat** commands. Then **reload** the switch.
- For 1900 series switches, use the **delete nvram** and **delete vtp** commands. Then **reload** the switch.

Set the switch's name using the **hostname** command

Set the enable password using the **enable secret** command

Set the line console and vty passwords using the **password** and **login** command

Set the switch IP address and subnet mask using the **ip address** command and activate the interface using the **no shutdown** command. *This is done in the VLAN 1 interface for a 2950 switch or global configuration mode for a 1900 switch*

Set the switch default gateway IP address and subnet mask using the **ip default-gateway** command.

*Don't forget to save your configuration using the **copy run start** command*

b. Configure the Hosts

Configure the hosts with the IP addresses, subnet masks and default gateway as specified in your documentation.

c. Verify Connectivity

Now check to see of the hosts can ping the switch

- Can host 1 ping the switch? _____
- Can host 2 ping the switch? _____
- Explain the ping results _____

  _____

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Task 3: Create Two New VLANs

Now you have completed the configuration of the switch and the hosts, you need to create two new VLANs and assign ports to each VLAN.

a. Display existing VLAN information

On the switch, type the following command at the Privileged EXEC prompt:

```
Switch#show vlan

1900:

Switch#show vlan-membership
```

Note: There should be an entry for VLAN 1 and the default VLANs (1002 +). If other VLANs appear, they should be deleted as instructed Task 2a.

b. Create the new VLANs

On the switch, enter the commands to create and name VLAN 2:

```
Switch#vlan database

Switch(vlan)#vlan 2 name VLAN2

Switch(vlan)#exit

1900:

Switch#config terminal

Switch(config)#vlan 2 name VLAN2
```

Now enter the appropriate commands to create **another VLAN named VLAN 3**

Use the `show vlan` command to verify that both VLANs have been created correctly.

c. Assign interfaces to the VLANs

On the switch assign the ports you decided on in Task1 to VLAN 2 and VLAN 3. As an example, the commands below will assign port 0/5 to VLAN 2.

```
Switch#configure terminal

Switch(config)#interface fastethernet 0/5

Switch(config-if)#switchport mode access

Switch(config-if)#switchport access vlan 2
```

1900:

```
Switch#config terminal

Switch(config)#interface Ethernet 0/5

Switch(config-if)#vlan static 2

Switch(config-if)#end
```

To check the port assignments, type the appropriate **show vlan** or **show vlan-membership**

Task 4: Create the Trunk

Now you have completed the VLAN configuration and port assignments on the switches, you need to create the trunk line.

a. Create the trunk

On the switch, type the following commands at the appropriate port interface command prompt.

2950:

This example uses the Fast Ethernet port 0/1. Refer to your table in Task 1 for the appropriate trunk port number to use.

```
Switch(config)#interface fastethernet 0/1

Switch(config-if)#switchport mode trunk
```

1900:

This example uses the Fast Ethernet port 0/26. Refer to your table in Task 1 for the appropriate trunk port number to use.

```
Switch#configure terminal

Switch(config)#interface fastethernet0/26

Switch(config-if)#trunk on
```

Note: *The 2950 switch will only support 802.1Q trunking and the 1900 switch will only support ISL trunking, not 802.1Q. It is not necessary to specify the encapsulation on these switch models.*

b. Verify the trunk

To verify a trunk port has been established, type the following at the Privileged EXEC mode prompt *using your trunk port number.*

```
show interface fastethernet 0/1 switchport
```

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Task 5: Configure the Router

The configuration of the trunk line has been completed at the switch end but now needs to be configured at the router end.

a. Configure the router

Now you need to configure the router. Complete the table below with details such as the router name and passwords.

	Router
HostName	
Enable Secret Password	
VTY and Console Password	
Subinterface 0/0.1 (for VLAN 1)	192.168.10.1 255.255.255.0
Subinterface 0/0.2 (for VLAN 2)	192.168.11.1 255.255.255.0
Subinterface 0/0.3 (for VLAN 3)	192.168.12.1 255.255.255.0
Encapsulation	

First configure the router with the hostname and passwords you decided on.

Next configure the Fast Ethernet interface using the following commands:

Note: *If you are working with a 1900 switch, you must replace the "**dot1q**" encapsulation with "**isl**" in the following router configuration commands.*

```
Router(config)#interface fastethernet 0/0

Router(config-if)#no shutdown

Router(config-if)#interface fastethernet 0/0.1

Router(config-subif)#encapsulation dot1q 1

Router(config-subif)#ip address 192.168.10.1 255.255.255.0
```

Use the **?** help function to see what the number **1** means for the command:-

```
Router(config-subif)#encapsulation dot1q 1
```

Now configure the remaining two subinterfaces fa0/0.2 and fa0/0.3. Just like above, you will need to enter the subinterface, set the encapsulation type, then set the IP address and subnet mask. Just to start you off, type in the following…

```
Router(config-if)#interface fastethernet 0/0.2
```

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b. Display the routing table

Type the `show ip route` command in Privileged EXEC mode to view the routing table.

Are there entries in the routing table? _____

What interface are they all pointing to? _____

c. Test the trunk line and the VLANs

If you have configured the trunk line correctly at the switch and router end, a host on one VLAN should be able to ping a host on another VLAN.

Connect host1 to a port in VLAN 1 and host2 to a port in VLAN 2

Should the hosts be able to ping each other? _____

Can the hosts ping each other? _____

Connect host1 to a port in VLAN 2 and host2 to a port in VLAN 3

Should the hosts be able to ping each other? _____

Can the hosts ping each other? _____

~~Create a screenshot showing host 1's ipconfig settings and successful ping of host 2~~

~~Print out your final switch and router configurations and label them appropriately~~

d. Restore the switch and router configurations to a default state

Erase the existing configuration and the vlan database from the switch and reload it. You should see the default switch prompt when it reloads. Then erase the router configuration and reload it.

Evidence

Please supply the following evidence to support your implementation of this task

~~Screenshots and configuration files required~~

- Screenshot showing the **ipconfig** and **ping** results of host 1 pinging host 2
- Printout showing the switch final configuration. Include suitable annotation pointing out parts you specifically configured.
- Printout showing the router final configuration. Include suitable annotation pointing out parts you specifically configured.

Please annotate, sign, date, put the portfolio exercise number and task number on all evidence pages